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FINAL PERFORMANCE REPORT

FEDERAL AID GRANT NO. F-50-R-14

FISH RESEARCH FOR OKLAHOMA WATERS

Project 18: Using Geographic Information Systems to Create and Analyze Spatial Relationships from Oklahoma Angler Data

OKLAHOMA DEPARTMENT OF WILDLIFE CONSERVATION

January 1, 2007 through December 31, 2007

FINAL PERFORMANCE REPORT

State: Oklahoma **Grant Number:** F-50-R-14

Grant Program: Sport Fish Restoration

Grant Title: Fish Research for Oklahoma Waters

Report Period: January 1, 2007 – December 31, 2007

Project Leader: Greg Summers

Project 18: Using Geographic Information Systems to Create and Analyze Spatial Relationships From Oklahoma Angler Data

Project Objective:
To identify and map angler density and available aquatic resources. To determine spatial relationship areas and boundaries by analyzing data sets created with geographic, licence, and human dimensions data.

Summary of Progress:

Introduction:
Human dimensions data in fisheries (fishing license sales data, angler opinion data, angler motivation, fishing specialization, etc.) are important in determining the degree of angler satisfaction with current agency policies and practices. The temporal variation in fishing license sales and other human dimensions data may in part reflect the satisfaction of anglers with the product provided to them by managers. Likewise, angler opinion surveys provide the license holders with an opportunity to voice their opinions about angling satisfaction. Both data can be used to better understand the wants and needs of licensed anglers, and provide managing agencies with a measure of angler satisfaction in current regulations and policies.

The number of anglers 16 years old and older in Oklahoma increased from 803,700 in 1991 to 924,149 in 1996 (Maharaj and Carpenter 1998). Despite the recent increase in anglers reported in the 1996 National Survey of Fishing, Hunting, and Wildlife-Associated Recreation, the angling population has not been increasing in proportion with population growth. As Oklahoma's population increases, the number of licensed anglers in the state should reflect that growth. However, this has not been the case in recent years. The Oklahoma Department of Wildlife Conservation (ODWC) uses media, personal contact with constituents, and local fishing education clinics to introduce and teach the sport of angling to Oklahomans. Despite agency efforts, the growth of licensed anglers remains

less than general population trends.

The ODWC has conducted angler opinion surveys in an effort to better provide anglers with a desired product (Summers 1990). Angler attitudes and opinions are important in determining how to better provide for Oklahoma anglers, leading to increased angler opportunity and participation. Learning what current anglers want helps agency personnel direct angler participation strategies more effectively. However, little of the data returned from angler surveys has been used to form and analyze spatial relationships between angler density and fishing resources available to them.

Geographic Information Systems (GIS) are computerized tools used to identify and analyze spatial relationships in data sets. Integrating GIS tools in the analysis of angler license sales data will allow for the development of specific angler density areas. Areas of low angler density or locations where angler satisfaction is low may be correlated with few aquatic resources or limited knowledge of available aquatic resources. Locating these areas of low angler participation density can provide the ODWC with specific areas to implement methods of increasing angler opportunity and angler densities. Areas found to have few aquatic resources may benefit from increasing angler opportunities on existing waters, or adding new and better aquatic resources for anglers.

In conjunction with angler license data analysis, GIS can also be used to assess angler opinion survey data to locate areas of varying satisfaction. Spatial analysis of these data may reveal trends which would allow agency strategies to be more effective by focusing on designated areas of interest.

Methods:

Data compilation (for non- ODWC data) was done by communicating with several public agencies and entities. Lifestyle, economic, census, and water resources data were all obtained by communication with outside sources. Once obtained, the data was edited to fit the needs of this project. In many cases data was appended to the master database through common linking variables. Fishing participation data housed by ODWC was also obtained from several divisions and or sections. All data, whether tabular or geographical, met specific standards of quality. The master database created from the various data sources is a tabular compilation, sorted spatially by zip code boundaries, and geocoded by license holder address.

Results and Discussion:

Human dimensions data was successfully obtained from the U.S. Census Bureau and the Information and Education Division of ODWC. Census data provided age, ethnicity, and material status classification by zip code. The ODWC license section provided license user data as well as a list of license vendors in Oklahoma and in surrounding states. Digital water body databases were obtained from the Oklahoma Water Resources Board and the Oklahoma Department of Environmental Quality. Fisheries sampling data was

provided within the Fisheries Division of ODWC. Additionally, lifestyle data was obtained to profile anglers with respect to their preferences in activities other than fishing.

Buffer areas of 5, 10, 15, and 25 miles around major Oklahoma lakes were created to develop a model for spatial analysis. The buffers were created for each lake (Figure 1), and then merged into single shapefiles for regional coverages (Figure 2) and statewide coverage (Figure 3). These buffers were used in a model to identify proximity (and to some degree availability of angling opportunity) to the geocoded address. The model was able to determine if any given address was within any of the 4 buffer areas, and if multiple buffer areas covered the address. Recently acquired ESRI Arc© software was used to perform the spatial analysis. These results will be further used as independent variables in a data mining predictive model to identify anglers who appear to be lapsing in their participation. Marketing efforts can then me made to increase fishing participation among this group.

Digital shapefiles and other ESRI support files for all layers of this project are housed at the Oklahoma Fishery Research Laboratory (OFRL) and available by request. The spatial analysis model used in this project is also located at OFRL.

Significant Deviations:
None.

Recommendations:
The model developed through this grant project can be used to assess the angling opportunities available by a specific area of interest (regional, county, statewide, etc.).

Literature Cited

Maharaj, V. and J. E. Carpenter. 1998. The 1996 economic impact of sport fishing in Oklahoma. American Sportfishing Association Publication, Alexandria, VA.

Summers, G. L. 1990. 1990 Oklahoma Angler Opinion Survey. Oklahoma Fishery Research Laboratory Bulletin No. 18, Norman, OK.

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Approved by:

Fisheries Administration
Oklahoma Department of Wildlife Conservation

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Figure 1. This map depicts a 10-mile buffer area (light green) around Lake Thunderbird, Oklahoma. Each buffer area was saved as a unique ESRI shapefile.

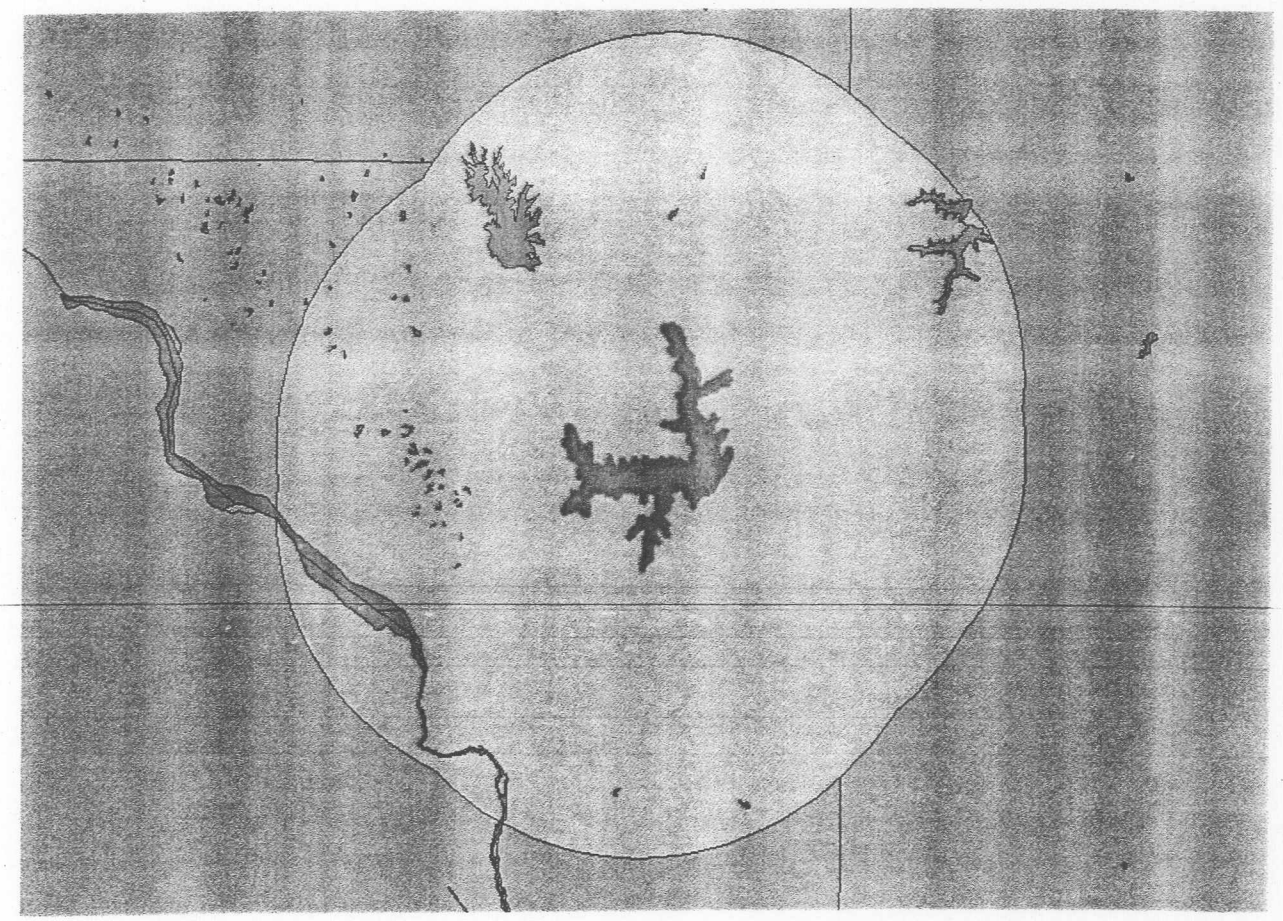


Figure 2. This map depicts a 25-mile buffer area (light purple) around major lakes greater than 1000 acres in Western Oklahoma. The buffer was created by merging buffers from individual lakes. Each buffer area was saved as a unique ESRI shapefile.

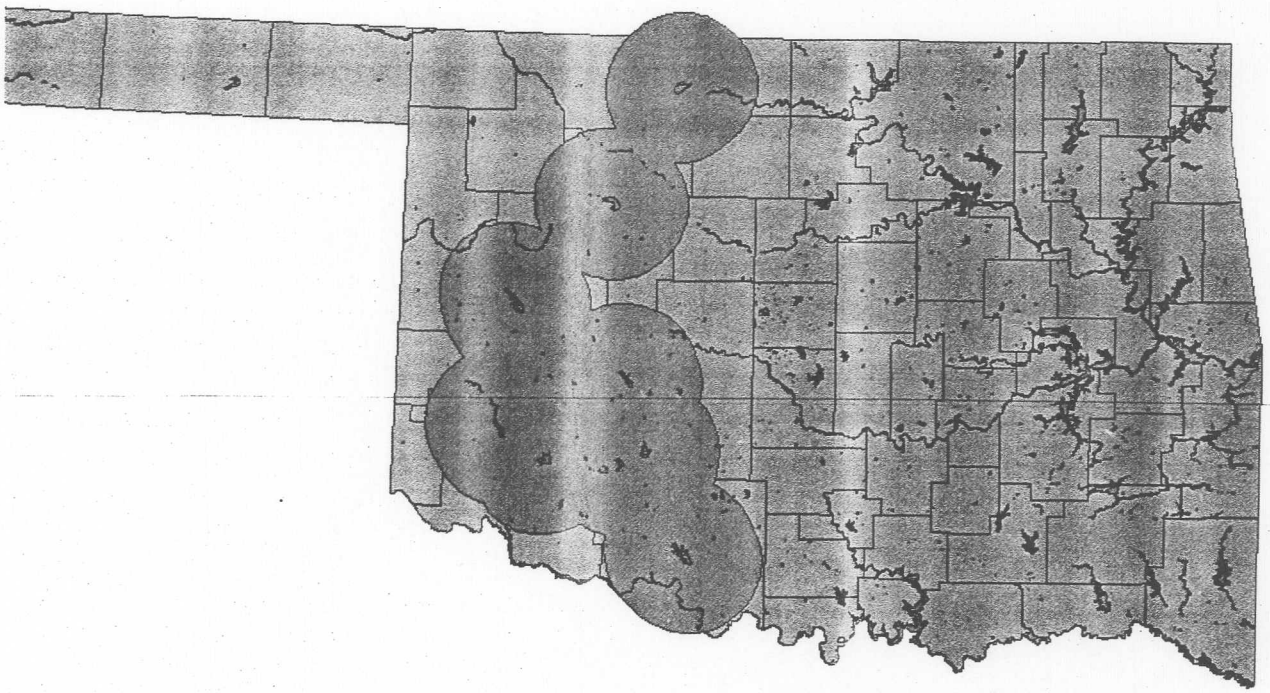
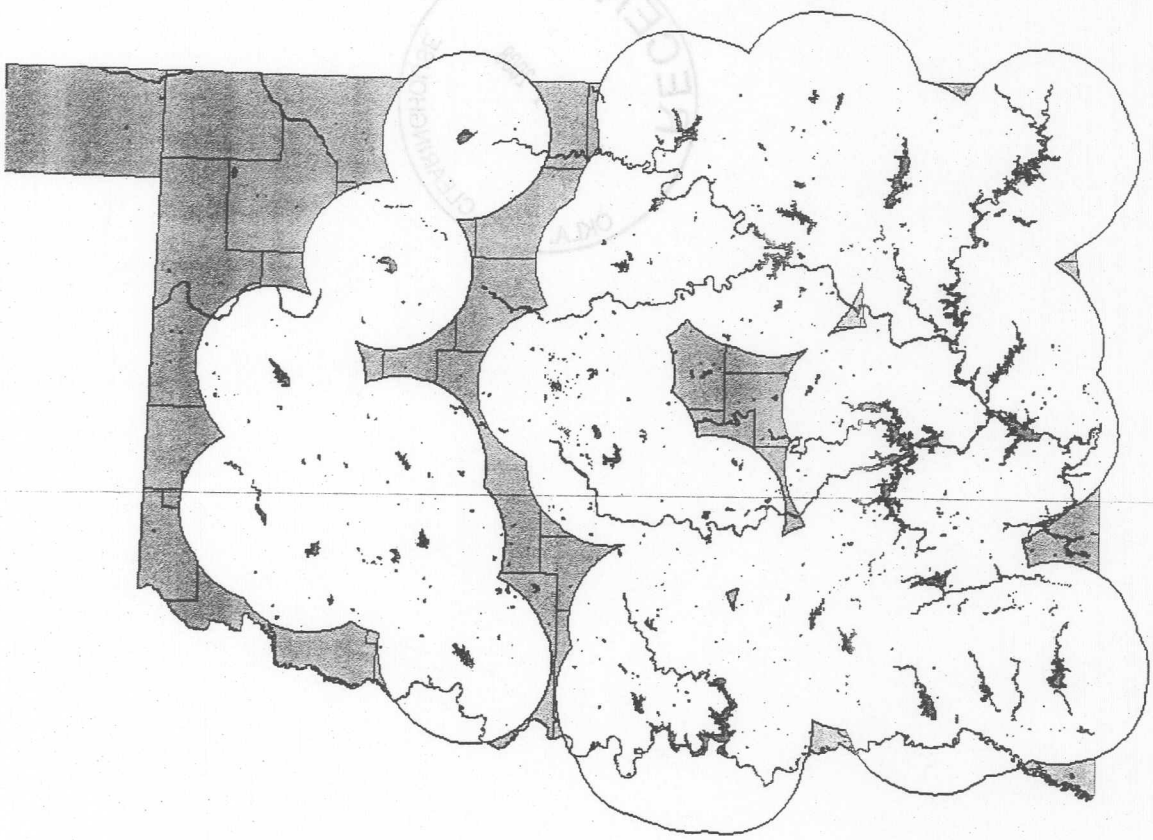


Figure 3. This map depicts a 25-mile buffer area (yellow) around major lakes greater than 1000 acres throughout Oklahoma. The buffer was created by merging buffers from individual lakes and regions. Each buffer area was saved as a unique ESRI shapefile.



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